AMENDMENTS TO THE CLAIMS

1. (Currently amended) A method comprising:

detecting a variation in resistance within a layered material stack in response to a scanning and injection of a non-contacting, remotely sourced electron stream into the layered material stack, the layered material stack having a first conductive contact layer, a second conductive contact layer, a variable resistive layer and a fixed resistive layer being positioned between the first and second conductive contact layers, and the variation in resistance within the layered material stack being based on one of a first resistive state and a second resistive state of the variable resistive layer;

wherein detecting the variation in resistance within the layered material stack includes:

detecting the first resistive state of the variable resistive layer in response to a distribution ratio of electrons from the electron stream flowing toward the first conductive contact layer; and

detecting the second resistive state of the variable resistive layer in response to a distribution ratio of electrons from the electron stream flowing toward the second conductive contact layer;

generating a first magnetic field and a second magnetic field within a transformer in response to the variations in resistance from within the layered material stack when the electron stream is scanned across the layered material stack, the transformer being operatively coupled to the first and second conductive contact layers; and

generating a differential output signal within the transformer based on the first and second magnetic fields, the differential output signal being associated with one of the first and second resistive states of the variable resistive layer.

2. (Original) The method of claim 1, wherein detecting the variation in resistance within the layered material stack comprises detecting a difference in current distribution within the layered material stack in response to the scanning and injection of the electron stream into the layered material stack, the layered material stack having a substrate layer and wherein the second conductive contact layer is a portion of the substrate layer.

3. (Canceled)

4. (Currently amended) The method of claim 4 [[3]], comprising detecting a third resistive state of the variable resistive layer.

5. (Original) The method of claim 1, wherein generating the first and second magnetic fields within the transformer comprises generating a third magnetic field within the transformer, the transformer having an identical number of turns.

6. (Original) The method of claim 1, wherein detecting the variation in resistance within the layered material stack comprises scanning and injecting the electron stream into the layered material stack, the layers of the layered material stack having layers of materials that are significantly larger in area than the cross sectional area of the electron stream.

7. (Original) The method of claim 1, wherein generating the first magnetic field comprises passing a first current through a first wire that is operatively coupled to the first conductive contact layer;

and wherein generating the second magnetic field comprises passing a second current through a second wire that is operatively coupled to the second conductive contact layer; and

wherein generating the differential output signal comprises positioning a sensor between the first and second wires to detect a vector sum of the first and second magnetic fields.

8. (Original) The method of claim 1, wherein generating the first and second magnetic fields within the transformer comprises generating a net magnetic field within a center-tapped transformer.

9. (Original) The method of claim 1, wherein the layered material stack comprises the variable resistive layer underlying the first conductive contact layer, the fixed resistive layer underlying the variable resistive layer, and the second conductive contact layer underlying the fixed resistive layer.

10. (Original) The method of claim 1, wherein the layered material stack further comprises a third resistive layer located between the first and second conductive contact layers.

11. (Original) The method of claim 10, wherein the third resistive layer is a second variable resistive layer.

12. (Original) The method of claim 1, comprising detecting a variation in resistance within the layered material stack in response to a scanning and injection of a non-contacting, remotely sourced electron stream into the layered material stack.

13.- 19. (Canceled)

20. (Currently amended) A method comprising:

injecting a non-contacting, remotely sourced electron stream from an energy source into a material stack of data storage medium, the material stack having a first and second conductive contact layers, a variable resistive information storage layer, [[and]] a fixed resistive layer, and a third resistive layer being positioned between the first and second conductive contact layers, the variable resistive information storage layer having a different resistance to each of the first and second conductive layers, the electron stream engaging the variable resistive layer through the first conductive contact layer, and the variable resistive layer having a plurality of resistive states;

detecting a difference in current distributed to the first and second conductive contact layers via a sensor in response to the injection of the electron stream into the material stack, the sensor having a first winding operatively coupled to the first conductive contact layer and a second winding operatively coupled to the second conductive contact layer, the sensor configured to generate an output signal proportional to the difference in the plurality of resistive states of the variable resistive layer, based on the difference in current between the first and second conductive contact layers.

21. (Original) The method of claim 20, wherein injecting the electron stream into the material stack comprises injecting the electron stream into the material stack having a substrate layer, and wherein the second conductive contact layer is a portion of the substrate layer.

22. (Original) The method of claim 20, wherein detecting the difference in current distributed to the first and second conductive contact layers via the sensor comprises:

detecting a first resistive state of the variable resistive layer in response to a distribution of electrons of the electron stream flowing toward the first conductive contact layer; and

detecting a second resistive state of the variable resistive layer in response to a distribution of electrons of the electron stream flowing toward the second conductive contact layer.

23. (Original) The method of claim 20, wherein the layered material stack comprises the variable resistive layer underlying the first conductive contact layer, the fixed resistive layer underlying the variable resistive layer, and the second conductive contact layer underlying the fixed resistive layer.

24. (Original) The method of claim 20, wherein the layered material stack comprises the fixed resistive layer underlying the first conductive contact layer, the variable resistive layer underlying the fixed resistive layer, and the second conductive contact layer underlying the variable resistive layer.

25. (Canceled)

26. (Original) The method of claim 20, wherein the sensor is a magneto-resistive sensor.

27. (Original) The method of claim 20, wherein the sensor is a transformer and further comprises a third winding to generate the output signal.

28. (Original) The method of claim 27, wherein detecting the difference in current distributed to the material stack comprises detecting the difference in current distributed to the material stack via a transformer having a first winding and a second winding with an identical number of turns relative to each other.

29. (Original) A system comprising:

an energy source configured to inject a non-contacting, remote electron stream into a material stack of a data storage medium, the material stack having a first and second conductive contact layers, a variable resistive information storage layer and one or more fixed resistive layers, the variable resistive information storage layer and the one or more fixed resistive layers being positioned between the first and second conductive contact layers, the variable resistive information storage layer having a different fixed resistance to each of the first and second conductive contact layers, and the electron stream engaging the variable resistive layer through the first conductive contact layer;

a power supply configured to provide an anode voltage to the first and second conductive contact layers of the material stack; and

a transformer having a first winding operatively coupled to the first conductive contact layer to provide the anode voltage from the power supply to the first conductive contact layer, a second winding operatively coupled to the second conductive contact layer to provide the anode voltage from the power supply to the second conductive contact layer, and a third winding configured to output a signal associated with one of a first resistive state and a second resistive state of the variable resistive layer in response to the difference between a first magnetic field and a second magnetic field generated by the first and second windings, the first and second windings being in a differential configuration relative to each other to generate the first and second magnetic fields based on a difference in current, and to detect a difference in current between the first and second conductive contact layers in response to the injection and distribution of the electron stream into the material stack.

30. (Original) The system of claim 29, wherein the first and second windings comprise an identical number of turns.

31. (Original) The system of claim 29, wherein the second conductive contact layer is one of a substrate layer and a portion of the substrate layer.

32. (Original) The system of claim 29, wherein the transformer is configured to detect the first resistive state of the variable resistive information storage layer in response to a distribution of electrons of the electron stream flowing toward the first conductive contact layer and to detect the second resistive state of the variable resistive information storage layer in response to a distribution of electrons of the electron stream flowing toward the second conductive contact layer.

33. (Original) The system of claim 29, comprising configuring the third winding to output another signal associated with a third resistive state of the variable resistive information storage layer.

34. (Original) The method of claim 29, wherein the material stack comprises one of the one or more fixed resistive layers underlying the first conductive contact layer, the variable resistive information storage layer underlying the one or more fixed resistive layers, and the second conductive contact layer underlying the variable resistive information storage layer.

35. (Original) The method of claim 29, wherein the material stack comprises two fixed resistive layers located between the first and second conductive contact layers.

36. (Currently amended) A method comprising:

detecting a number of variations in resistance within a layered material stack in response to a scanning and injection of an electron stream into the layered material stack, the layered material stack having a first conductive contact layer, a fixed resistive layer underlying the first conductive contact layer, a variable resistive layer underlying the fixed resistive layer, and a substrate layer underlying the variable resistive layer, and the number of variations in resistance within the layered material stack being based on at least one of a first resistive state and a second resistive state of the variable resistive layer;

wherein detecting the number of variations in resistance within the layered material stack includes:

detecting a first resistive state of the variable resistive layer in response to a distribution ratio of electrons from the electron stream flowing toward the first conductive contact layer; and

detecting a second resistive state of the variable resistive layer in response to a distribution ratio of electrons from the electron stream flowing toward the substrate layer;

generating a first magnetic field and a second magnetic field within a transformer in response to the number of variations in resistance from within the layered material stack when the electron stream is scanned across the layered material stack, the transformer being operatively coupled to the first conductive contact layer and the substrate layer; and

generating a differential output signal within the transformer based on a vector sum of the first and second magnetic fields, the differential output signal being associated with one of a number of resistive states of the variable resistive layer.

37. (Canceled)

38. (Original) The method of claim 36, wherein detecting the number of variations in resistance within the layered material stack comprises scanning and injecting the electron stream into the layered material stack, the layers of the layered material stack having layers of materials that are significantly larger in area than the cross sectional area of the electron stream.